



NAMRL Special Report 00-01

**A HEALTH-RISK APPRAISAL OF NAVAL
SPECIAL OPERATIONS FORCES
PERSONNEL: EXECUTIVE SUMMARY**

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Reviewed and approved

1/14/00

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ABSTRACT

The relationship between exposure to extreme physical and mental activities and adverse environments to the susceptibility to injuries, disease, and death has not been examined for Special Operations Forces (SOF) personnel. The purpose of the Health Risk Appraisal (HRA) was to assess individual health risk levels related to the personal lifestyle factors. A 62-question survey was developed, implemented, and analyzed in order to assess general health behaviors and status, and to examine special warfare issues specific to the environment and tasks of the SOF personnel. Respondents were 971 (48 ± 16.1 years) male active-duty, reserve, and retired members of the Sea, Air, Land/ Underwater Demolition Teams (SEAL/UDT). Evaluation of these results used national health promotion and disease prevention objectives set forth by the U.S. Department of Health and Human Services. Results from the self-reported study showed low smoking rates and high physical activity rates; low prevalences of coronary artery disease (CAD), diabetes, and obesity (overweight) were also found. These were considered positive health findings for this group. Unhealthy behaviors included high smokeless tobacco use rates, heavy drinking, low safety belt use, and drunk driving. There was also a high prevalence of cancer/tumors, musculoskeletal problems, sexually transmitted diseases, esophagitis, and precancerous skin lesions. The preliminary data in this study did not provide adequate information to discern to what extent mission tasks and environment play in heightening the member's risk of developing the aforementioned conditions. Further research examining the causes of these high health risks may be warranted.

Acknowledgments

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PROBLEM

The Department of the Navy lacks baseline epidemiological and health data to adequately assess and track the health status of the Naval Special Operations Forces (SOF) personnel. These personnel participate in unique training programs and missions that place great stresses on their physical and psychological health. Currently, no data exist to support or refute the effects of these extreme activities and adverse environments on the susceptibility to injuries, disease, and death for SOF.

BACKGROUND

The purpose of the health Risk Appraisal (HRA) was to assess individual SOF health-risk levels related to lifestyle factors. Using the Healthier People: Health Risk Appraisal Program (Healthier People Software, Tucson, AZ), a health-risk survey was developed, implemented, and analyzed. This questionnaire consisted of two parts: a health-risk section and a special warfare section (Appendix). The general (health) section was a standardized survey consisting of 34 questions regarding demographics and health behaviors. No modifications were made to the standardized health-risk section to allow for comparisons to responses of other surveyed groups. Issues specific to the environment and tasks of the SOF personnel were covered in the special warfare section. There were 28 questions in this section. The questionnaire was developed with the assistance of the Naval Special Warfare Command. To simplify the reports, factors were grouped into four categories: demographic (age, race, education), health behaviors (tobacco use, alcohol consumption, safety belt use, driving habits, diet/nutrition), health status (body mass index, diseases, illnesses), and special warfare issues (injuries and illnesses due to SOF environment and activities).

RESULTS AND DISCUSSION

The analyses included frequency and percentages of all variables. In addition, cross-tabulation analysis between each health behavior/health status variable and age category was performed because many health status and health behavior factors may be age-related. The evaluation of these results used national health promotion and disease prevention objectives set forth by the U.S. Department of Health and Human Services (i.e., Healthy People 2000) (8). Health Risk Appraisal data collected from Alabama Power (AP) Company male employees ($n = 891$) in 1998 was used as well as the results from the Department of Defense survey of the Health-Related Behaviors Among Military Personnel, U.S. Navy responses (2), as comparison groups. Tables contain results data from these groups; dashed lines (--) in table cells represent no available data for that specific category and group.

DEMOGRAPHICS

Respondents were 971 male, active-duty, reserve, and retired members of the Sea, Air, and Land and Underwater Demolition Team (SEAL/UDT) teams (Table 1). The mean age was 48 years (standard deviation, ± 16.1 years). The ages ranged from 21 to 90 years. Respondent's race and education are listed in Table 1.

HEALTH BEHAVIORS

The low smoking rates and high physical activity among the SOF personnel were positive health behavior findings (Table 2). The objective of Healthy People 2000 for smoking rates among military members is 20%. The percentage of persons who smoke in the SOF (4.7%) was much lower; it is noted that most current smokers of the SOF fall into the 46 to 60-year-old category, at 8.7%. Tobacco use is the most important single preventable cause of death in the United States, accounting for one of every five deaths or some 430,000 deaths annually (3, 4, 10). The low smoking rates found in this study decrease the risk of medical conditions associated with smoking (i.e., chronic obstructive pulmonary disease and cancers).

Table 1. Demographics in Overall Number and Percentage for Race and Education

Race and Education	Frequency	Percentage
African-American	10	1.1
Asian	3	0.3
Hispanic	28	3.0
Indian	13	1.4
Islander	4	0.4
White, non-Hispanic	856	93.1
Some high school/graduate	180	19.4
Some college	301	32.5
College graduate	253	27.3
Graduate school	193	20.8

Table 2. Health behavior percentages for SOF, Americans (US), Alabama Power male employees (AP), and U.S. Navy (USN) populations

Behavior	Percentage			
	SOF	US	AP	USN
Current prostate exam	52.9*	38.0*	--	--
Drinking	14.1	5.2	7.0	13.1
Drunk driving/riding	12.0	--	4.3	--
High-cholesterol diet	48.5	66.0	45.9	--
High-fiber diet	92.3	52.0	88.0	--
Motorcycle helmet use	84.1	64.0	--	76.1
Physical activity	79.1	40.0	40.0	67.7
Safety belt use	80.0	--	92.0	92.8
Smokeless tobacco use	11.7	5.9	7.6	10.4
Smoking	4.5	27.0	10.2	30.6
Speeding	9.4	--	5.0	--

*Represents men over 50 years of age

Physical activity levels were high (80.0%), as expected from this population. Regular physical activity increases cardiorespiratory efficiency and lean mass, decreases fat mass, and provides stress-reduction properties, among its other properties (5). Although the SOF community excelled in the previous categories, they showed more negative or unhealthy behaviors than good ones. One behavior of particular interest was a high rate of smokeless tobacco use (11.7%). The under-31 age group had an even higher user rate of 28%. When compared to U.S. Navy members between the ages of 18 and 24 years, this rate was still much higher (28% vs. 19%). Smokeless tobacco use is associated with health consequences that range from halitosis to more severe health problems, such as various forms of oral cancer (6, 11).

Heavy drinking is defined as more than two drinks daily. By this definition, 14% of SOF respondents were heavy drinkers. This percentage was comparable to, but still greater than, the Navy-wide percentage of 13.1%. Alcohol is a factor in more than 45% of all motor vehicle fatalities, approximately 33% of homicides and suicides, and 22% of fatal boating accidents (9) as well as deaths associated with liver disease.

HEALTH STATUS

Body mass index (BMI) calculations, using each individual's height and weight measures, were calculated to determine the number of overweight respondents (Equation 1):

$$\text{Body Mass Index (BMI)} = \frac{\text{Weight (kg)}}{\text{Height}^2 \text{ (m)}} \quad (1)$$

Overweight is defined as a BMI equal to or greater than 25. Overall, 11% of the respondents were overweight based on the BMI. When separated by age groups, only 2.1% of the sample group under-31 and 8.8% of the over 31 age group were overweight. Navy personnel who were overweight numbered 22.9% (under 20 years old) and 19.5% (over 20 years old). The objective for the American population (per Healthy People 2000) is 15% (8).

Results of this study showed increased health risks in SOF with respect to cancer/tumor, sexually transmitted diseases (STDs), muscular pain, broken bones, orthopedic surgery, and esophagitis. Skin cancer was the most prominent type of cancer seen in the respondents. Whether this is due to the mission environment or perhaps an active, outdoor lifestyle of the individuals is unknown at this time. Cancer, however, is the second leading cause of death in the United States (7). Statistics show that in 1995 1.2 million Americans were diagnosed with cancer and approximately 547,000 persons died of cancer (1).

Table 3. Health Status Percentages for SOF, United States (US), Alabama Power (AP), and U.S. Navy (USN) populations.

Health Status	Percentage			
	SOF	US	AP	USN
Body mass index/obesity	10.9	34.0	--	26.2
Cancer/tumors	17.3	3.0	--	1.7
Coronary artery disease	7.2	25.0	--	2.1
Diabetes	4.6	5.9	1.9	0.4
Esophagitis/chronic heartburn	14.7	14.8	--	3.8
High blood pressure	6.4	22.0	--	8.0
High cholesterol	16.4	18.0	54.0	14.3
Pre-cancerous skin lesions	20.6	--	--	--
Sexually transmitted diseases	10.2	26.0	--	19.2
Sterility/infertility	4.7	--	--	1.5
Bone fractures	31.5	--	--	--
Musculoskeletal pain	62.9	--	--	--
Orthopedic surgery	37.5	--	--	--

SPECIAL WARFARE ISSUES

Areas of interest in this section were injury rates from special warfare environments and activities, counseling for psychiatric problems, and contraction of rare or hard to treat illnesses (Table 4). Some results have high percentages, which may be due to the respondents who were active duty SOF during Vietnam. Shipboard injuries ranged from cuts and bruises to bullet wounds, near-drownings, and dislocations.

Table 4. Special Warfare Issues—Percentage of Respondents Replying Positively.

Issue	Percentage
	SOF
Injured in a jump	31.1
Air gas embolism	2.0
Decompression sickness	8.2
Pulmonary overinflation syndrome	1.3
Suffered a near drowning	17.0
Diving-related seizure	2.9
Wounded by bullets, etc.	20.7
Been in actual combat	42.9
Psychiatric counseling	10.0
Hard-to-treat illnesses	13.0
Injured shipboard	30.2

CONCLUSIONS

Although there were strong positive findings in the SOF personnel (low smoking rates, physically active, low prevalence of CAD, diabetes, and obesity), the unhealthy behaviors are a concern. Also of interest is the high prevalence of various diseases and injuries (i.e., cancer, musculoskeletal disorders, STDs, esophagitis) in this population. The preliminary data did not provide adequate information to discern to what extent mission tasks and environment play in heightening the member's risk for developing a condition. Further research examining the possible causes (i.e., personality, self-selection for job, genetics, etc.) of these high health risks is warranted. Special attention needs to be given to musculoskeletal problems in upcoming research. There is an exorbitantly high rate of chronic pain, fractures, and orthopedic surgery in this group. Examination of training methods, with respect to performance and operational environments, may be of assistance in determining what is causing these high percentage rates.

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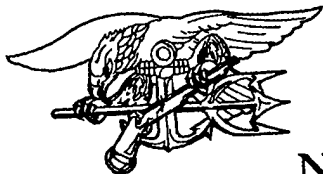
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APPENDIX

Health Risk Appraisal Survey

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Naval Special Warfare Command

Naval Aerospace Medical Research Laboratory



Health Risk Appraisal

IDENTIFICATION NUMBER

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The health risk appraisal is an educational tool, showing you choices you can make to keep good health and avoid the most common causes of death (for a person your age and sex). This health risk appraisal is **not** a substitute for a check-up or physical exam that you get from a doctor or nurse; however, it does provide some ideas for lowering your risk of getting sick or injured in the future. It is **NOT** designed for people who already have HEART DISEASE, CANCER, KIDNEY DISEASE, OR OTHER SERIOUS CONDITIONS. If you have any of these problems, please ask your health care provider to interpret the report for you.

DIRECTIONS:

To get the most accurate results, **answer as many questions as you can.** If you do not know the answer, leave it blank.

The following questions must be completed or the computer program cannot process your questionnaire.

1. SEX 2. AGE 3. HEIGHT 4. WEIGHT 5. CIGARETTE SMOKING

Please write your answers in the boxes provided.

⇒ (Examples: ☒ or 98)

1. SEX	1 <input type="checkbox"/> Male 2 <input type="checkbox"/> Female
2. AGE	____ Years
3. HEIGHT	(Without shoes) _____ Feet _____ Inches (No fractions)
4. WEIGHT	(Without shoes) _____ Pounds (No fractions)
5. Body frame size	1 <input type="checkbox"/> Small 2 <input type="checkbox"/> Medium 3 <input type="checkbox"/> Large
6. Have you ever been told that you have diabetes (or sugar diabetes)?	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No
7. Are you now taking medicine for high blood pressure?	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No
8. What is your blood pressure now?	____/____ Systolic (High Number)/Diastolic (Low Number)
9. If you do not know the numbers, check the box that describes your blood pressure.	1 <input type="checkbox"/> High 2 <input type="checkbox"/> Normal or Low 3 <input type="checkbox"/> Don't know
10. What is your TOTAL cholesterol level (based on a blood test)?	____ mg/dl
11. What is your HDL cholesterol (based on a blood test)?	____ mg/dl
12. How many cigars do you usually smoke per day?	____ cigars per day
13. How many pipes of tobacco do you usually smoke per day?	____ pipes per day
14. How many times per day do you usually use smokeless tobacco? (Chewing tobacco, snuff, pouches, etc.)	____ times per day

15. CIGARETTE SMOKING

How would you describe your cigarette smoking habits?

1 ☐ Never smoked**Go to 18**2 ☐ Used to smoke**Go to 17**3 ☐ Still smoke**Go to 16****16. STILL SMOKE**

How many cigarettes a day do you smoke?

____ cigarettes per day

Go to 18**GO TO QUESTION 18****17. USED TO SMOKE**

a. How many years has it been since you smoked cigarettes fairly regularly?

____ years

b. What was the average number of cigarettes per day that you smoked in the 2 years before you quit?

____ cigarettes per day

18. In the next 12 months, how many thousands of miles will you probably travel by each of the following?

(NOTE: U.S. average = 10,000 miles)

a. Car, truck, or van:

____,000 miles

b. Motorcycle:

____,000 miles

19. On a typical day, how do you USUALLY travel? (Check one only)

1 ☐ Walk2 ☐ Bicycle3 ☐ Motorcycle4 ☐ Sub-compact or compact car5 ☐ Mid-size or full-size car6 ☐ Truck or van7 ☐ Bus, subway or train8 ☐ Mostly stay home

20. What percent of the time do you usually buckle your safety belt when driving or riding?

____%

21. On the average, how close to the speed limit do you usually drive?

1 ☐ Within 5 mph of limit2 ☐ 6-10 mph over limit3 ☐ 11-15 mph over limit4 ☐ More than 15 mph over limit

22. How many times in the last month did you drive or ride when the driver had perhaps too much alcohol to drink?

____ times last month

23. How many drinks of alcoholic beverage do you have in a typical week?

____ Bottles or cans of beer

____ Glasses of wine

____ Wine coolers

____ Mixed drinks or shots of liquor

24. About how long has it been since you had a rectal or prostate exam?

1 ☐ Less than 1 year ago2 ☐ 1 year ago3 ☐ 2 years ago4 ☐ 3 or more years ago5 ☐ Never

25. How many times in the last year did you witness or become involved in a violent fight or attack where there was a good chance of a serious injury to someone?

1 ☐ 4 or more times2 ☐ 2 or 3 times3 ☐ 1 time or never4 ☐ Not sure

26. Considering your age, how would you describe your overall physical health?

1 ☐ Excellent2 ☐ Good3 ☐ Fair4 ☐ Poor

27. In an average week, how many times do you engage in physical activity (exercise or work which lasts at least 20 minutes without stopping and which is hard enough to make you breathe heavier and your heart beat faster)?

1 ☐ Less than 1 time per week2 ☐ 1 or 2 times per week3 ☐ At least 3 times per week

28. If you ride a motorcycle or all-terrain vehicle (ATV), what percent of the time do you wear a helmet?

1 ☐ 75% - 100%2 ☐ 25% - 74%3 ☐ Less than 25%4 ☐ Does not apply to me

29. Do you eat some food every day that is high in fiber, such as whole grain bread, cereal, fresh fruits or vegetables?

1 ☐ Yes2 ☐ No

30. Do you eat foods every day that are high in cholesterol or fat, such as fatty meat, cheese, fried foods, or eggs? 1 ☐ Yes 2 ☐ No
31. In general, how satisfied are you with your life? 1 ☐ Mostly satisfied
2 ☐ Partially satisfied
3 ☐ Not satisfied
32. Have you suffered a personal loss or misfortune in the past year that had a serious impact on your life? (For example, a job loss, disability, separation, jail term, or the death of someone close to you.) 1 ☐ Yes, 1 serious loss or misfortune
2 ☐ Yes, 2 or more
3 ☐ No
- 33a. Race 1 ☐ Aleutian, Alaskan native, Eskimo, or American Indian
2 ☐ Asian
3 ☐ Black
4 ☐ Pacific Islander
5 ☐ White
6 ☐ Other
7 ☐ Don't know
- 33b. Are you of Hispanic origin such as Mexican-American, Puerto Rican, or Cuban? 1 ☐ Yes 2 ☐ No
34. What is the highest grade you completed in school? 1 ☐ Grade school or less
2 ☐ Some high school
3 ☐ High school graduate
4 ☐ Some college
5 ☐ College graduate
6 ☐ Post graduate or professional degree

SPECIAL WARFARE ISSUES

1. Have you ever had a gas embolism? 1 ☐ Yes ☐ No
2. Have you ever had the bends? 2 ☐ Yes ☐ No
3. Have you ever had a pulmonary overinflation syndrome? 3 ☐ Yes ☐ No
4. Have you ever had a seizure related to diving? 4 ☐ Yes ☐ No
5. Have you ever suffered a near drowning? 5 ☐ Yes ☐ No
6. How many SDV dives have you made in your life? 6 _____
7. How many parachute jumps have you made in your life? 7 _____
8. Have you ever been injured on a parachute jump? If yes, please describe the injury. 8 ☐ Yes ☐ No
-
9. Have you ever been wounded by bullets, mines, shrapnel, etc? 9 ☐ Yes ☐ No
10. How many times have you been in actual combat? 10 _____
11. Have you ever had any rare, hard to treat, or hard to diagnose illnesses (such as malaria, coccidioidomycosis, asbestosis, or tropical sprue)? If yes, what? 11 ☐ Yes ☐ No
-
12. Have you ever undergone psychiatric counseling? 12 ☐ Yes ☐ No
13. Have you ever had family counseling for stress management? 13 ☐ Yes ☐ No ☐ N/A
14. Have you ever been divorced? 14 ☐ Yes ☐ No ☐ N/A
15. Have you ever had muscular or skeletal pain in the shoulders, arms, hips, legs, or back lasting more than six weeks? 15 ☐ Yes ☐ No
16. Have you ever broken any bones? 16 ☐ Yes ☐ No
17. Have you ever had orthopedic surgery? If yes, describe the injury or disorder that warranted the surgery. 17 ☐ Yes ☐ No
-
18. Have you ever been injured aboard or had any injury associated with duty on Special Warfare boats or ships? If yes, describe the injury. 18 ☐ Yes ☐ No
-
19. Have you ever had coronary artery disease, including heart attack? 19 ☐ Yes ☐ No
20. Have you ever had esophagitis, chronic heartburn, or stomach ulcers? 20 ☐ Yes ☐ No
21. Have you ever had any neurologic disorder like Alzheimer's or Lou Gehrig's disease? 21 ☐ Yes ☐ No

SPECIAL WARFARE ISSUES

- | | | |
|--|---------------------------------|-----------------------------|
| 22. Have you been treated more than once in your life for a sexually transmitted disease? | 22 <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 23. Have you ever been medically evaluated or treated for sterility? | 23 <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 24. Have you ever had a pterygium, a cataract, or macular degeneration of the eye? | 24 <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 25. Have you ever had any pre-cancerous skin lesions like actinic keratosis? | 25 <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 26. Have you ever had any form of cancer or any tumor requiring medical or surgical treatment? If so, what kind? | 26 <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| <hr/> | | |
| 27. Have you ever suffered from a sleep disorder? | 27 <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 28. In which BUD/S did you graduate? | 28 _____ | _____ |

If you have questions or comments about this survey, please contact the Force Medical Officer, Naval Special Warfare Command.

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